

PROJECT NUMBER: 2107  
PROJECT TITLE: Filter Research & Development  
PROJECT LEADER: C. J. Campbell  
PERIOD COVERED: November, 1989

I. IMPROVED FILTRATION - INCREASED EFFICIENCY:

- A. Objective: Develop filter systems with a higher efficiency than presently available and evaluate them for subjective advantages.
- B. Status: CA WEB: Analysis of the CA Web filter rods produced at Intertaba indicate that the rod to rod RTD coefficient of variation is between 10.6 and 12.3%. This is not as good as the numbers reported by Celanese (9%) for the same web material. Causes of this difference are being investigated.

NEW WEB TECHNOLOGY: Two samples of conventional paper which were experimentally acetylated and made into filter rods at Intertaba were subjectively evaluated by a small Flavor panel. The materials were described as not like CA or paper, but one of the samples was judged somewhat like CA. Equivalent delivery cigarettes with these filters are being prepared for further testing.

A sample of paper filter material and one of meltblown polypropylene web have been coated with a solution containing cellulose acetate and then dried. Filters will now be made from these materials for subjective evaluation.

Two versions of handsheets have been made from 75% CA/25% Soft Wood and 75% CA/24% Soft Wood/1% CMC (binder), spliced into rolls, corrugated and made into sample filters. These will now be subjectively evaluated in order to determine the effect of a combined CA/paper web.

Eastman has been asked to supply 300 lbs. of 2.0 dpf staple cut into 1/4" lengths for a pilot sheetmaking run at the University of Maine. Sheet properties of paper produced with 1/4" staple was comparable to those of paper made with shorter cut length.

PAPER FILTERS: Preliminary testing and modeling is being done in preparation for making a series of equivalent delivery cigarettes with CA, CA Web, and Paper filters for subjective characterization.

II. IMPROVED FILTRATION - MENTHOL STABILITY:

- A. Objective: Investigate methods of improving the stability of menthol delivery in smoke of aged cigarettes.
- B. Status: As a result of discussions held under our secrecy agreement, Eastman has successfully spun filter tow with 3, 7, and 14% triacetin contained in the dope prior to spinning. This

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material has been made into filter rods by Eastman and will be fabricated into cigarettes by Semiworks in early December. The stability of menthol delivery in smoke will be examined as the cigarettes undergo ageing.

Analytical data on menthol delivery of filters made with 4% triacetin applied at 160°F is being received and will be evaluated for the possible stabilization of menthol delivery.

### III. IMPROVED FILTRATION - NOVEL FILTER SYSTEMS:

- A. **Objective:** Develop and evaluate new and unique cigarette filters which may offer a distinct product advantage.
- B. **Status:** CONCENTRIC FILTERS: A dual cambridge pad holder has been fabricated which separates the inner and outer smoke flows from concentric filters and is being evaluated by CI personnel on a 20 port smoking machine. Initial results indicate a 80/20% outer/inner split for the filters tested. Additional trials are planned.

A series of seven concentric filter models have been ordered from Filtrona which cover a range of theoretical core to peripheral flow ratios. These will be evaluated analytically and subjectively to characterize their performance.

Smoke delivery of various filter systems has been videotaped and will be studied in an attempt to characterize the physical delivery of smoke to the subjective response.

RHODIA: Representatives of Rhodia's R&D Department presented an overview of their current programs to Philip Morris R&D. Their work with meltblown materials, additives, and their process of supercrimping are particularly interesting to us and will be pursued.

### IV. IMPROVED FILTRATION - SELECTIVE FILTRATION:

- A. **Objective:** Explore the use of specific additives in filters for selective filtration or subjective modification of smoke.
- B. **Status:** CARBOWAX REPLACEMENT: PM Super Lights models have been made with a 30% more active carbon in an effort to reduce the weight of carbon per tip and still achieve the desired gas phase filtration. These are currently in CI for analytical testing.

ALTERNATIVE PLASTICIZERS: Models of Marlboro Lights cigarettes made in Semiworks with triethyl citrate and diethyl malonate plasticizers in the filter at 5 and 8% are currently being subjectively evaluated by the OC smoking panel. Additional plasticizers are being investigated.

CARBON: A seminar was given by two researchers from Calgon Carbon describing the function of activated carbon as a filtration medium to a general audience on November 30 in the R&D lecture hall.

V. FILTER SUPPORT FOR OTHER R&D PROGRAMS:

- A. **Objective:** Provide design assistance and potential new filter systems for other R&D programs.
- B. **Status:** ART: Numerous ART models made with CA filters containing sodium carbonate, high denier tows, and paper filters are being evaluated by the ART Project team.

HIGH TASTE/LOW TAR: Two Project Lowvent cigarette models, targeted for 2mg tar at 35% ventilation, were made in Semiworks and are now in CI for testing.

LARK VENTILATION VARIABILITY STUDY: Analytical results of cigarettes made with a Kimberly-Clark porous combining wrap with a spiral hotmelt pattern and two Ecusta porous wraps with a patterned hotmelt show a significant decrease in ventilation variability compared to production Lark Milds KS cigarettes. The best Ecusta wrap achieved an average ventilation of 40% (control 24%) and a coefficient of variation of 14% (control 25%). Models produced with the ventilation into the cavity were better, with a ventilation of 49% and a COV of 8%. The machinability and hot collapse performance of this wrap is equivalent to the current material. This Ecusta wrap has been recommended as a replacement to the current mechanically perforated wrap which is now yielding highly variable product.

Operations Services and the Japan Product Development Group will conduct an additional trial prior to implementation. Development of the Kimberly-Clark wrap will be pursued as a second supplier.

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